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Domain structure investigation of Mn-doped PIN-PMN-PT relaxor ferroelectric single crystals

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PMN-PT single crystal has excellent piezoelectric properties (d_{33}>1500 pC/N, k_{33}~90%), while low Curie temperature (T_c) and low rhombohedral–tetragonal phase transition temperature ($T_{R\text{-}T}$) limit its application. As a result, ternary system PIN-PMN-PT which have higher T_c (180-200 ^{o}C), $T_{R\text{-}T}$ (100-150 ^{o}C) and larger coercive field are widely investigated and grown. Meanwhile, "Hard dopant" as a kind of chemical modification is usally used to harden PIN-PMN-PT expecting higher Q_m and larger coercive filed.

In our work, 0.2mol% Mn doped PIN-PMN-PT single crystal were successfully fabricated. The composition, domain structure, and properties of obtained single crystal along the growth direction were investigated. The effect domain structure on the properties of the crystal were studied.